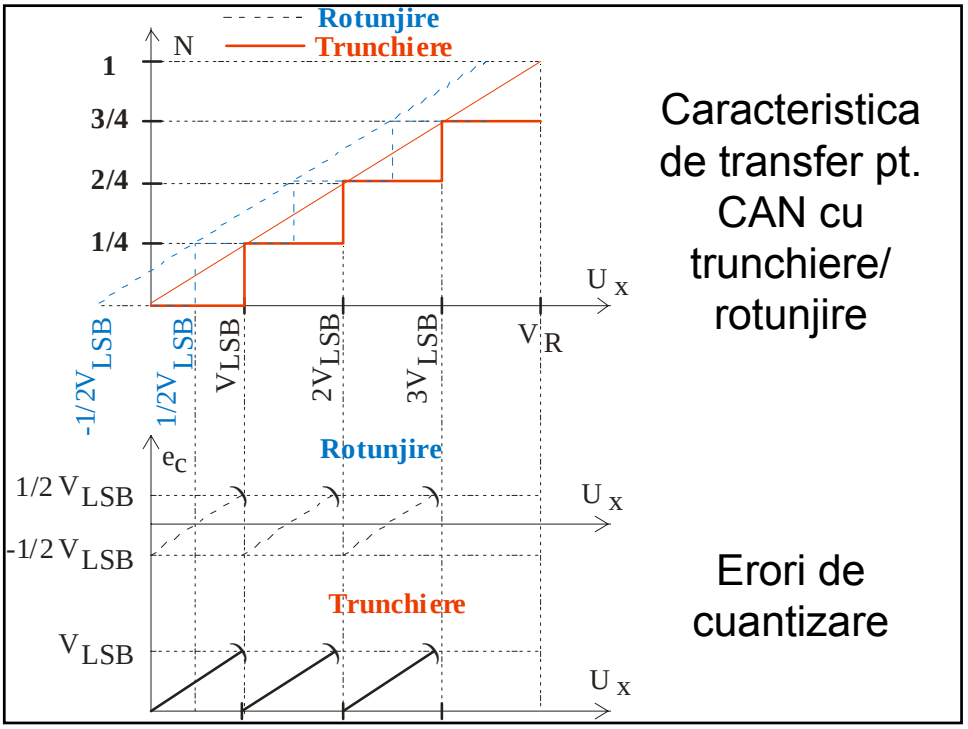
Convertoare Analog-Numerice

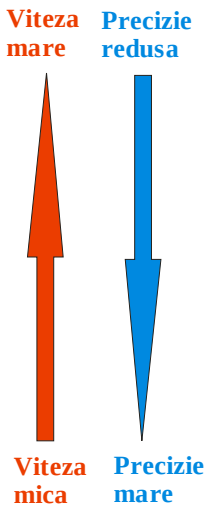


Caracteristica de transfer pt. CAN cu trunchiere/ rotunjire

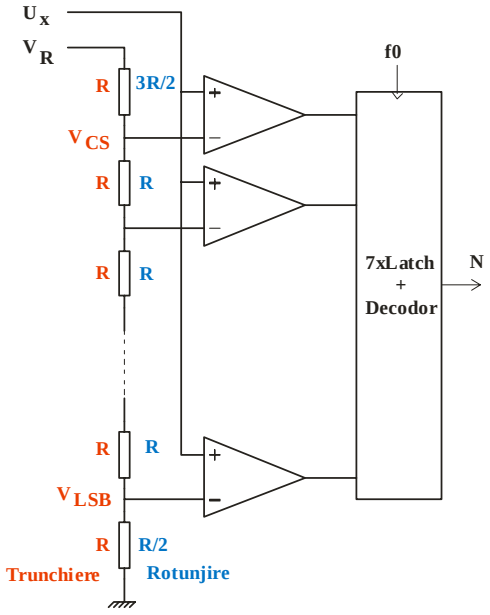
Erori de cuantizare

Clasificare CAN

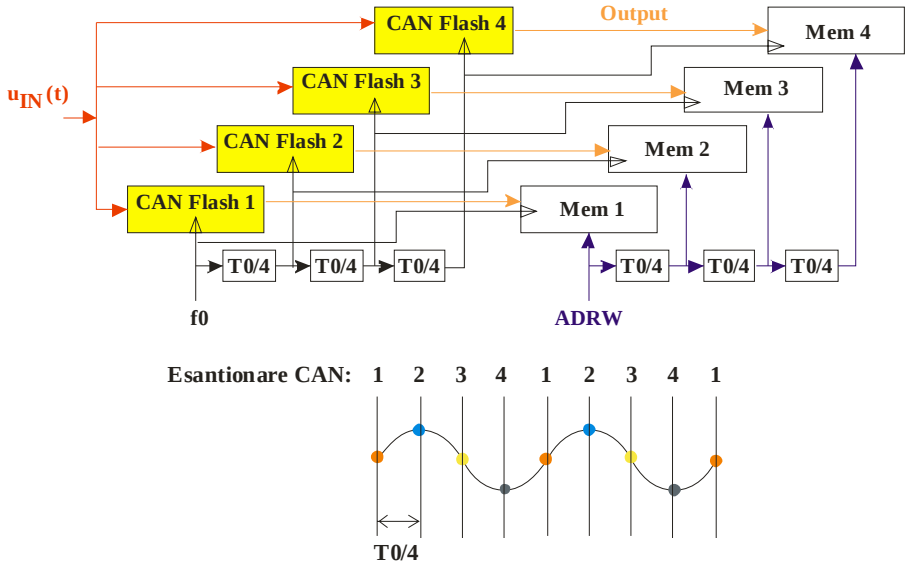
- Neintegratoare
  - Fără reacție
    - Paralel (Flash)
    - Paralel-serie
    - Serie
  - Cu reacție
    - Cu AS
    - Cu rampă în trepte
    - Cu urmărire
- Integratoare
  - Convertoare tensiune-frecvență
  - Cu 1 o pantă
  - Cu 2 sau mai multe pante



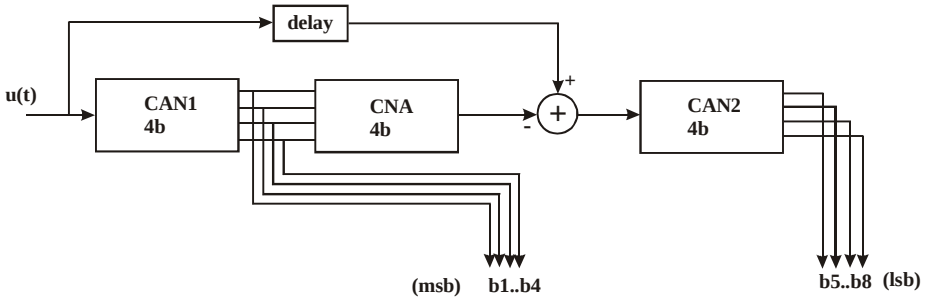
CAN Flash (Paralel)



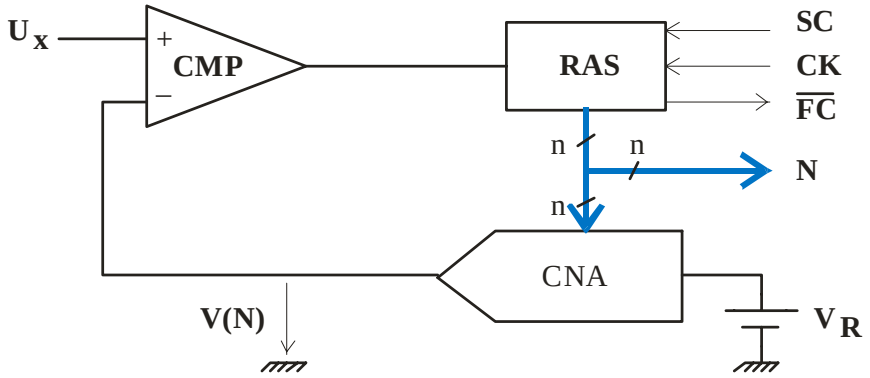
CAN Flash Pipeline



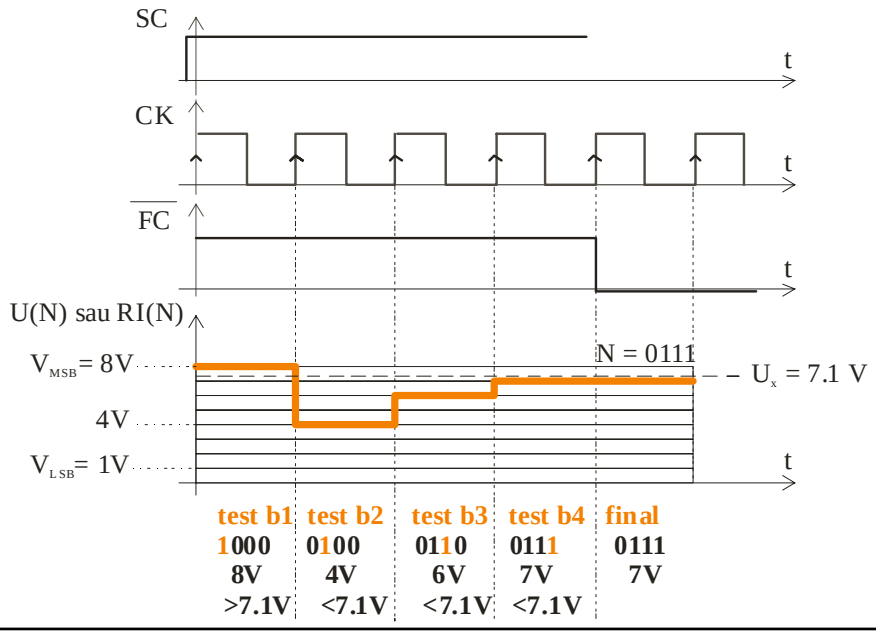
CAN paralel-serie



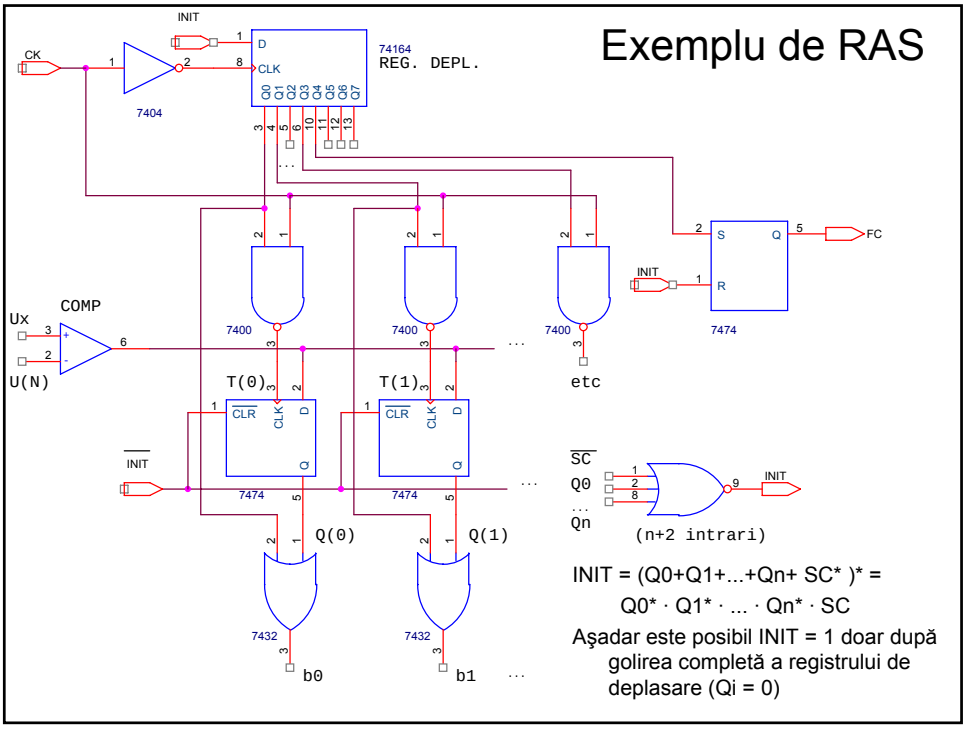
CAN AS



F.U. CAN AS U_X=7.1V U_R=16V n=4b



Exemplu de RAS

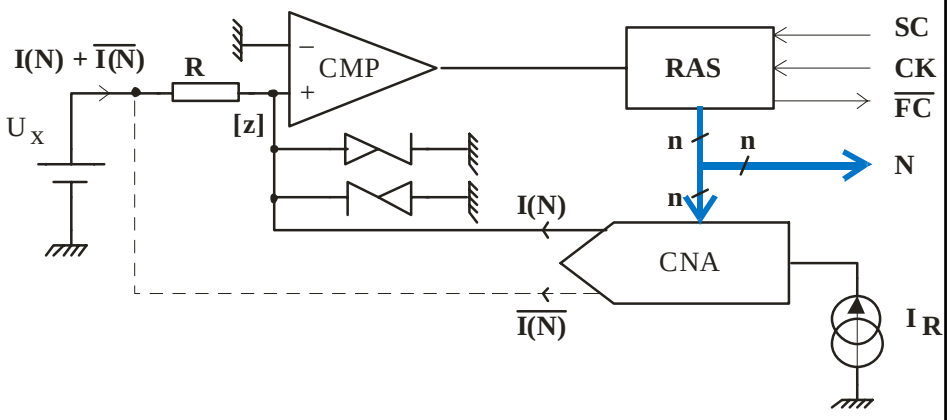


INIT = (Q0+Q1+...+Qn+ SC*)* =

Q0* · Q1* · ... · Qn* · SC

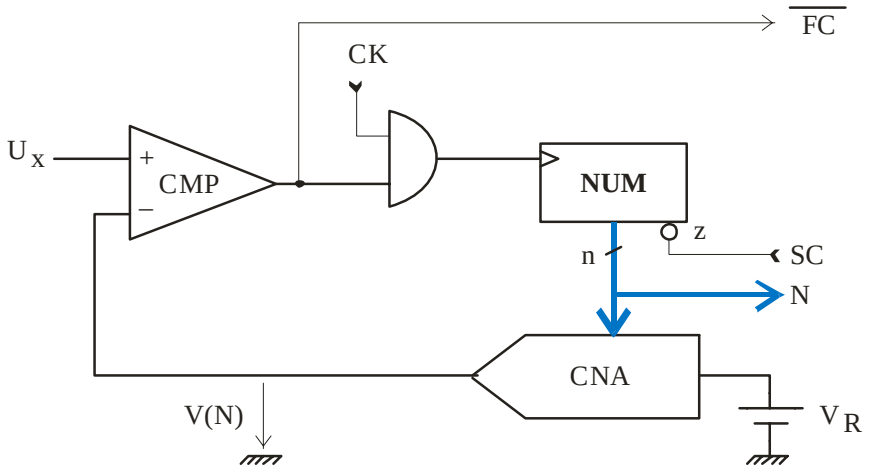
Aşadar este posibil INIT = 1 doar după golirea completă a registrului de deplasare (Qi = 0)

CAN AS – varianta în curent

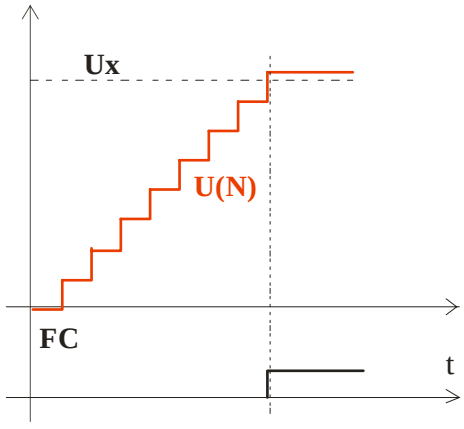


Condiția $U_X > U(N)$ devine $U_X - RI(N) > 0$

CAN cu rampă în trepte

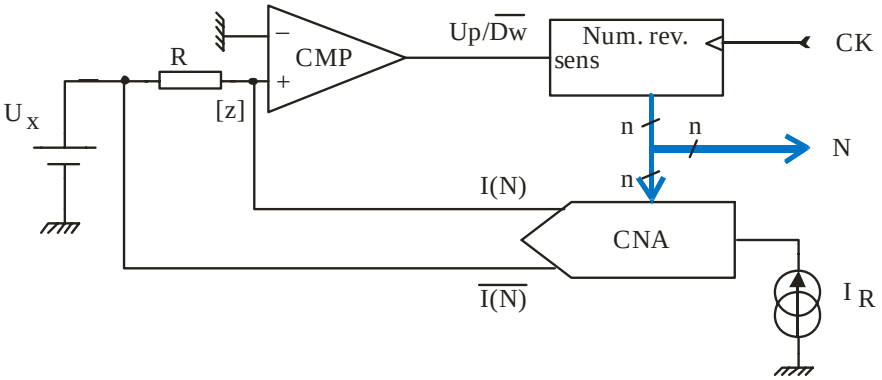


CAN cu rampă în trepte

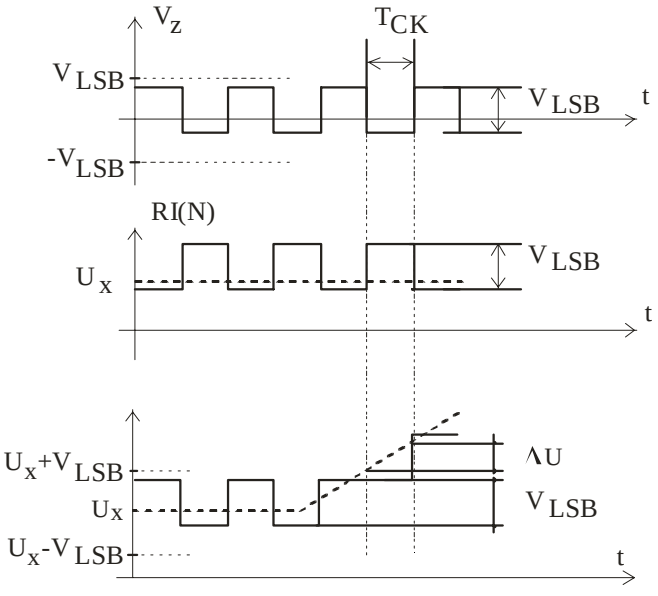


$T_{CONV} = (2^n-1)T_{CK}\ U_x/U_R$

CAN cu urmărire



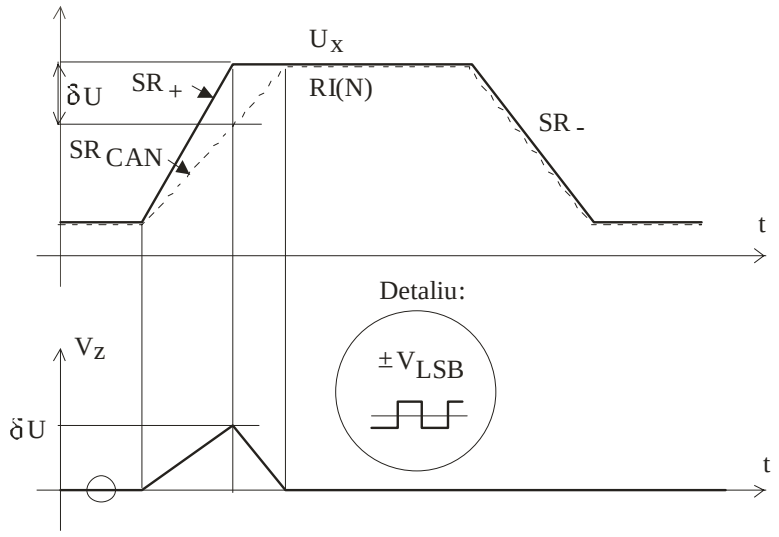
F.U. CAN cu urmărire



Condiție pentru urmărire:

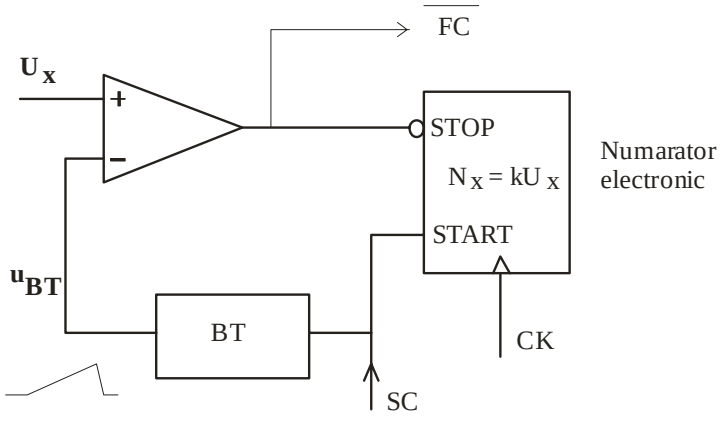
$\Delta U < V_{LSB}$

F.U. CAN cu urmărire

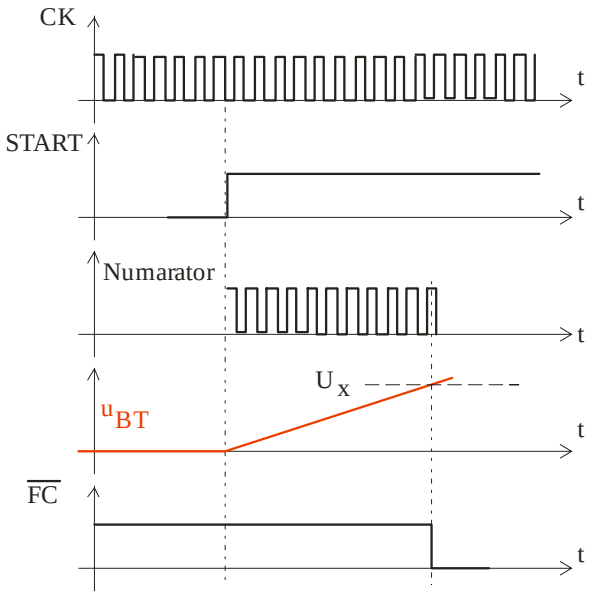


Semnal: SR_+, SR_- CAN: SR_{CAN}

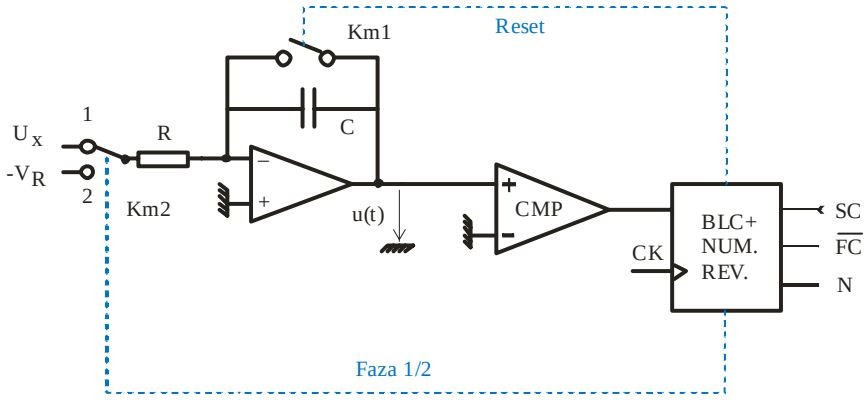
CAN simplă pantă



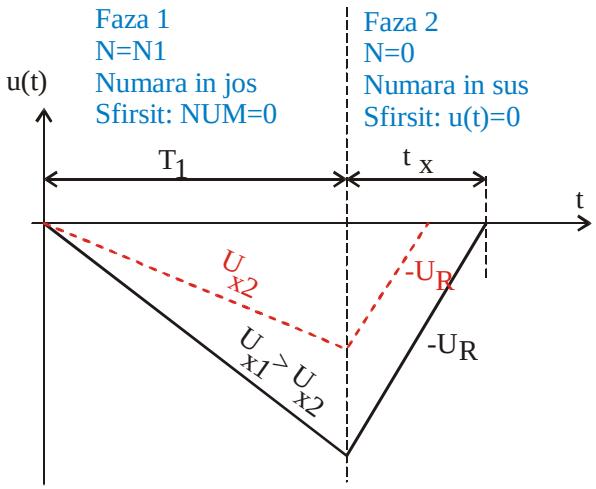
F.U. CAN simplă pantă



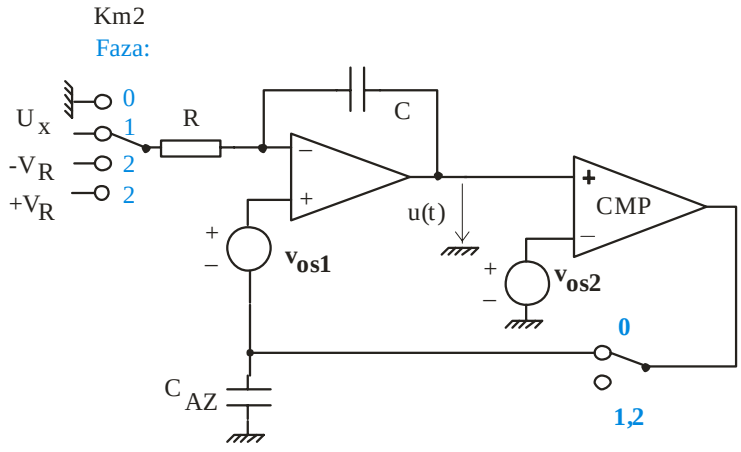
CAN dublă pantă



F.U. CAN DP

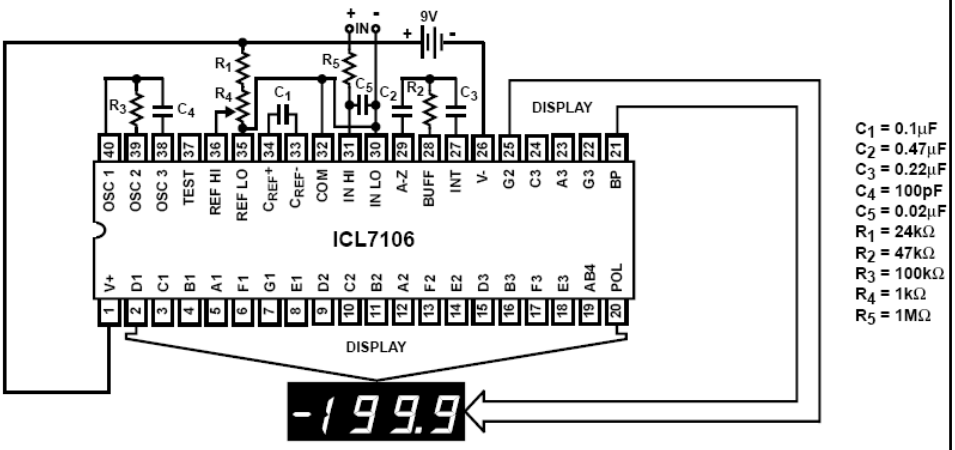


CAN DP cu DAS şi CAZ



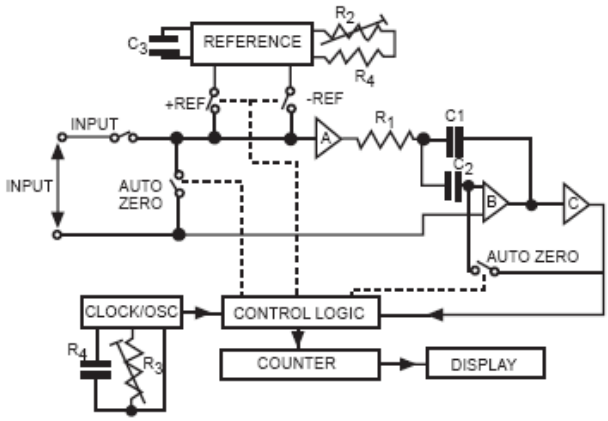
Faza 0: auto-zero

Aplicație CAN DP: voltmetru cu 3 ½ digiți şi afişaj LCD cu ICL7106



Sursa: Intersil

Principiu de funcționare ICL7106

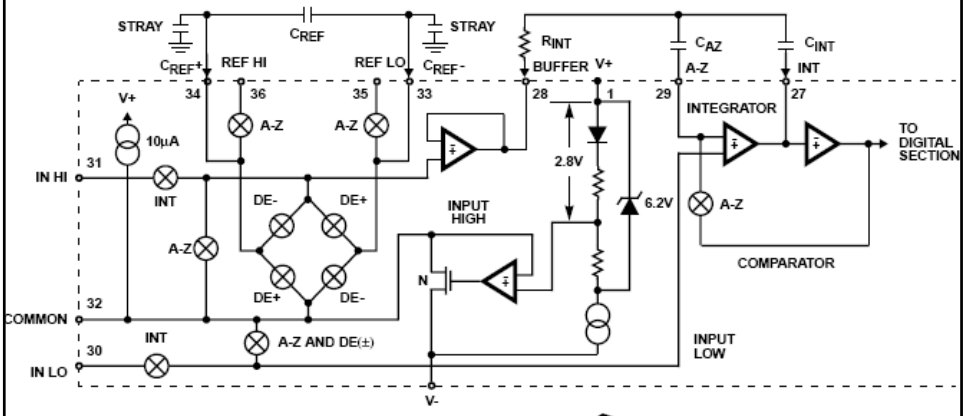


Comutator	Faza 1	Faza 2	Faza AZ
INPUT	închis	deschis	deschis
+REF	deschis	dep. de semn Vin	deschis
-REF	deschis	dep. de semn Vin	deschis
AUTO-ZERO	deschis	deschis	închis

Schema de principiu ICL7106/7107

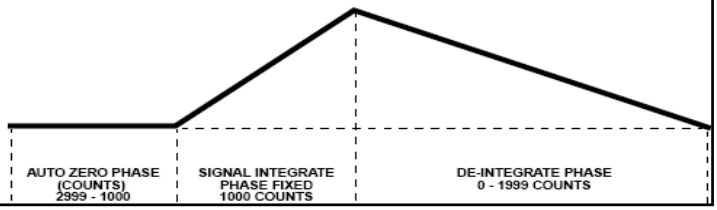
(vezi datasheet pentru mai multe detalii privind funcționarea)

V_{CS}=200mV, V_{REF}=100mV

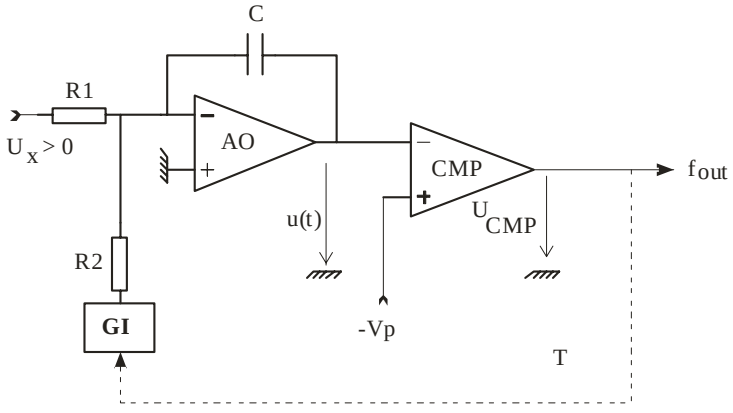


Faze:

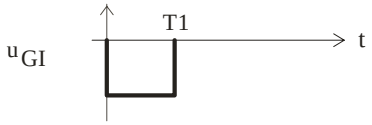
- A-Z (faza 0)
- INT (integrare - faza 1)
- DE (de-integrare - faza 2)



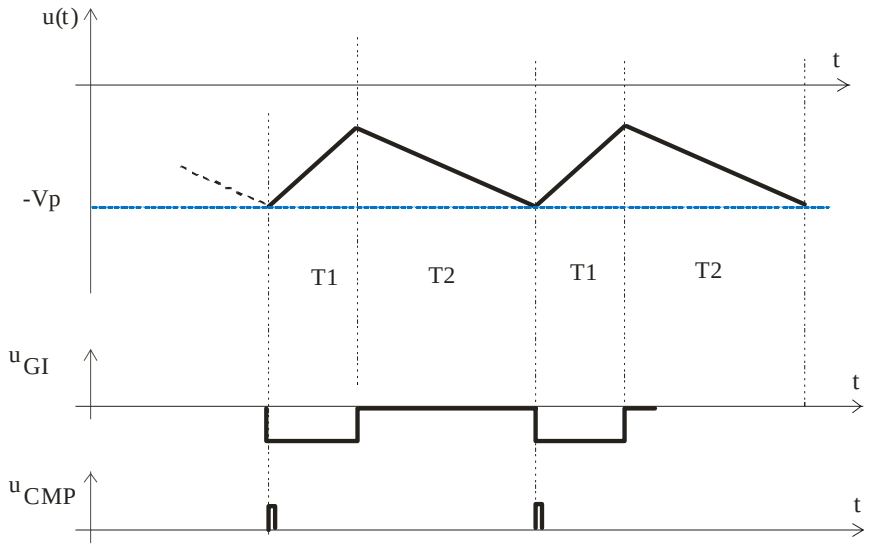
CAN cu conversie U-f
(cu echilibrare de sarcină)



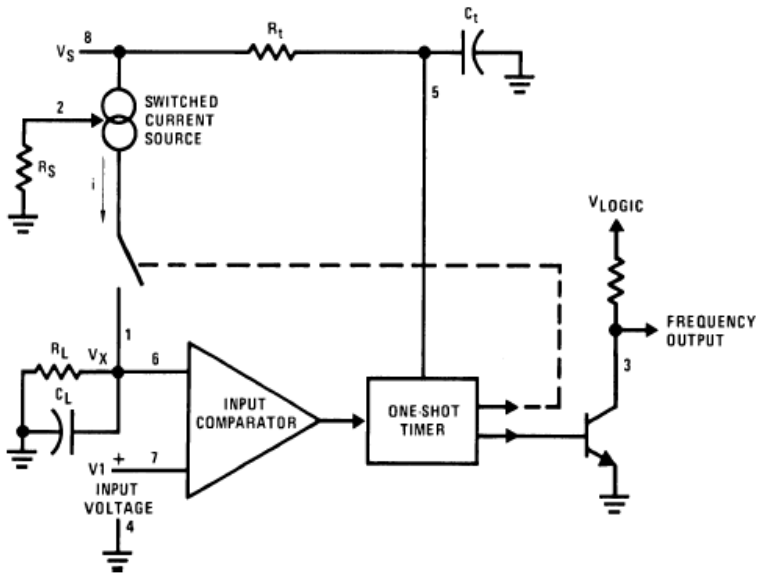
T1=ct



F.U. CAN U-f

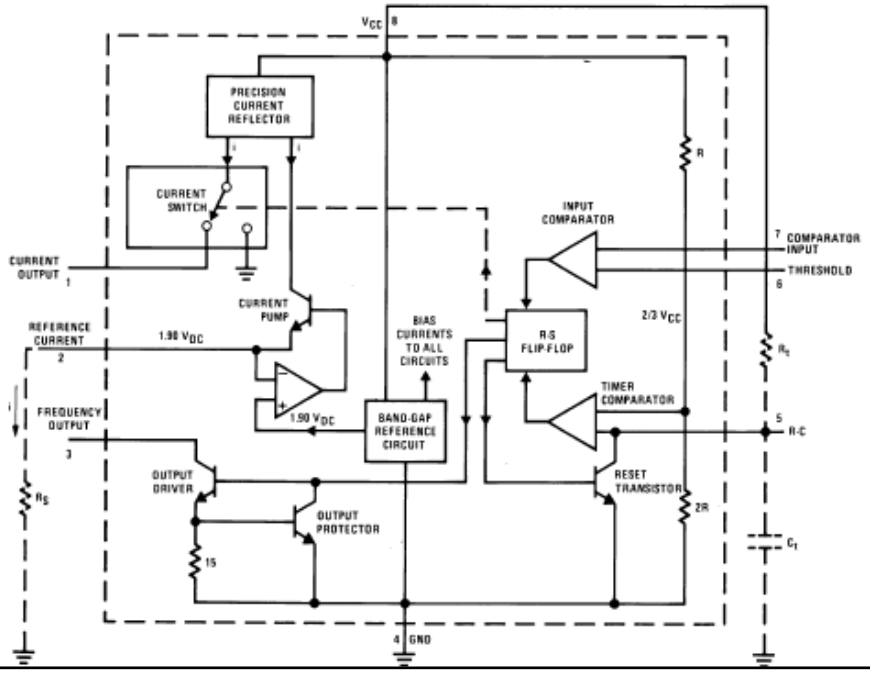


Convertor U-f LM331: schema simplificată

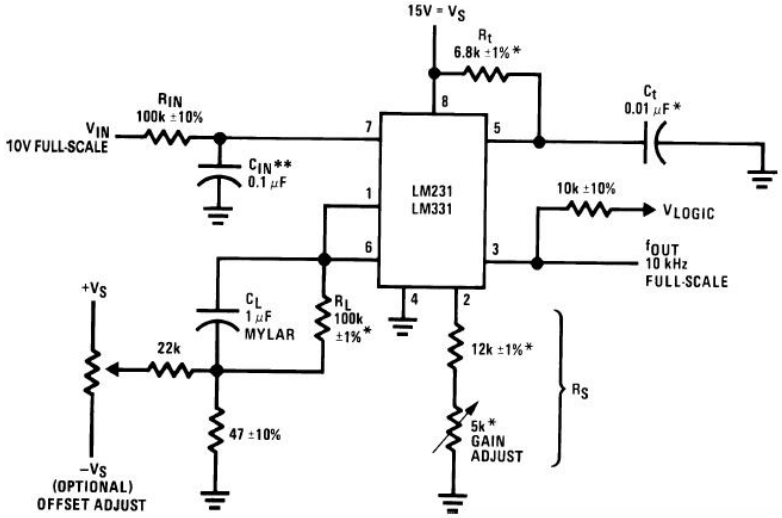


Sursa: National Semiconductor

LM331 – schema de principiu



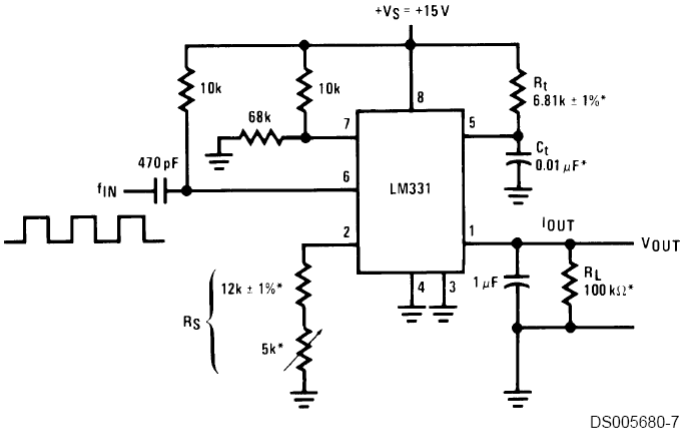
Aplicație: convertor U-F cu LM331



$V_{in} \in (0,10V) \Rightarrow f_{OUT} \in (0,10KHz)$

$$f_{OUT} = \frac{V_{IN}}{2.09\ V} \bullet \frac{R_S}{R_L} \bullet \frac{1}{R_t C_t}$$

Aplicație LM331: Convertor f-U



$$V_{OUT} = f_{IN} \times 2.09V \times \frac{R_L}{R_S} \times (R_t C_t)$$

Sursa: National Semiconductor

Lanț U-f, f-U pentru telemăsură